Chemical & Engineering News
Serving the chemical, life sciences and laboratory worlds

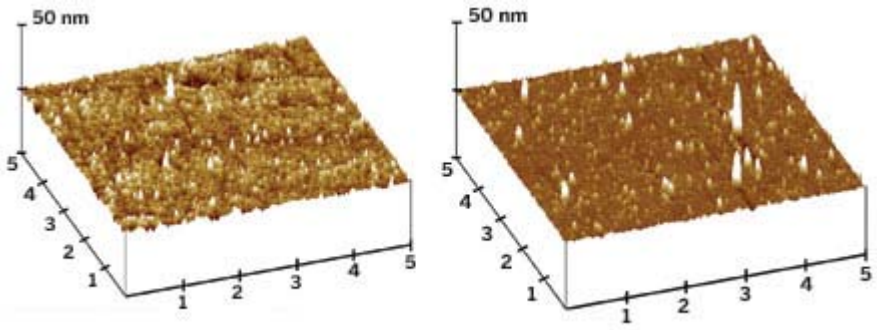
Latest News

December 16, 2009

Older Is Better

Protein Analysis: Microarray performance is degraded with newer glass slides

Celia Henry Arnaud



Anal. Chem.

ROUGH STUFF Differences can be seen with AFM in the surface roughness of glass microscope slides purchased before (left) and after 2008.

When it comes to glass microscope slides as substrates for protein microarrays, older is better. In general, microscope slides bought before 2008 make better microarray substrates than do newer ones, according to Chris R. Taitt and coworkers at the Naval Research Laboratory (NRL) in Washington, D.C. (*Anal. Chem.*, DOI: 10.1021/ac902324r). The finding is a cautionary tale for researchers who use such microarrays as biosensors to detect proteins.

Earlier this year, Taitt and coworkers found that they were suddenly having problems using well-established silane chemistry to attach proteins to microscope slide surfaces. The problems resulted in biosensors with poor sensitivity. "An awful lot of people use this silane chemistry, whether they're just modifying the surface to make it more or less hydrophilic or hydrophobic or immobilizing biomolecules for biosensors," Taitt says.

After experiments by Stella H. North fingered the slides as the culprits, Taitt called in colleagues Scott G. Walton and Evgeniya H. Lock from the Plasma Physics Division at NRL to characterize the slides. Using X-ray photoelectron spectroscopy and atomic force microscopy, they found that most microscope slides purchased before 2008 contained more magnesium and had rougher surfaces than newer slides. Taitt and her collaborators are still trying to figure out how low magnesium content and smoother surfaces lead to poor protein immobilization. They saw these differences between high-magnesium and low-magnesium slides in all the brands they tested.

Thermo Fisher Scientific, manufacturer of several of the slides tested, says it hasn't received reports from its customers of performance differences. "The production process used by Thermo Fisher for manufacturing glass slides has not changed since 1935," a company spokesperson says.

"Who would have guessed that both the surface chemistry and surface roughness of microscope slides sold all over the country have changed," says Frances Ligler, another NRL scientist who works with biosensors but was not involved in this research. "This paper reminds scientists wondering why their analytical data is not as good as that obtained by their predecessors to confirm the quality of even the simplest of their starting materials."

Chemical & Engineering News
ISSN 0009-2347
Copyright © 2009 American Chemical Society